This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

REPORT

OF

T. S. HARDEE,

CITY SURVEYOR OF NEW ORLEANS,

ON A SPECIAL SURVEY

OF

LAKE PONTCHARTRAIN,

IN CONNECTION WITH THE EFFECTS OF THE

BONNET CARRE CREVASSE,

AND THE DANGERS FROM

OVERFLOW,

WITH ACCOMPANYING CHART.

PUBLISHED BY AUTHORITY OF THE CITY COUNCIL.

NEW ORLEANS:
A. W. HYATT, STATIONER AND PRINTER, 38 CAMP STREET,
1876.

Hosted by Google

Hosted by Google

LAKE PONTCHARTRAIN.

OFFICIAL REPORT OF THE CITY SURVEYOR.

The effects of Bonnet Carrè Crevasse on the physical condition of the Lake—Impending dangers of overflow from a concurrence of river floods with easterly gales—An appropriation from Congress suggested to close the Crevasse.

SURVEYOR'S OFFICE,
New Orleans, September 25, 1876.

To the Honorable Mayor and Administrators of the City of New Orleans:

GENTLEMEN—In response to the resolution adopted by your honorable body on the 2d of May, 1876, the United States Government generously placed the revenue cutter Dix at the service of the city authorities, for the purpose of assisting in a special survey of Lake Pontchartrain, and I now have the honor to report, as your engineer officer in charge, that the work has been conducted to a satisfactory termination.

The object of the survey was to determine the effect of the Bonnet Carrè crevasse on the physical condition of the lake, and to deduce from the facts thereby elicited the prospective dangers which might threaten the city of New Orleans from that source. The results are not as full and complete in some details as might have been desired, owing to the fact that there was no previous survey made by the Government, and therefore no records in existence by which to compare present soundings with those of

Hosted by Google

the past. In consequence of this deficiency, and the want of means on the part of the city to undertake the amount of work involved in an original survey, attention was mainly directed to discover the existence of sedimentary deposits in the lake, and then by suitable examinations to determine the location and area of the same, believing that the information thus obtained, in connection with the knowledge of other well established physical peculiarities, would satisfy all requirements in the premises.

With the view of accomplishing the work projected, a new contrivance of a combination rod was ordered to be constructed, which answered successfully the double purpose of taking soundings and borings at the same time.

PRELIMINARY EXAMINATIONS,

made in a general way over the lake, at various points, from Pass Manchac to the Rigolets, developed the fact that the deposits were being made principally in a compact mass at the western end of the lake, where the rapid discharge of river overflow is finally checked by contact with the tidal expanse, and to this locality the labors of the survey were chiefly directed.

The present crevasse, which was caused in the spring of 1874 by a breach in the levee at Bonnet Carrè bend, about thirty-five miles above the city, is now 1370 feet in width, in a direct line across the gap, and as the discharge of water courses towards Lake Pontchartrain, five miles distant, it widens in a fan-like shape, so that by the time it reaches the shore of the lake the flow of water has attained a breadth of more than twenty-two miles, as will be seen by the section colored blue on the accompanying chart. The difference in elevation between the highest water in the river at the head of the crevasse, and the ordinary tidal level of Lake Pontchartrain is about eighteen feet, and the discharge of water through the crevasse when the river is in the neighborhood of flood height has been estimated to be about one-tenth of the volume of the entire river which passes at that point. With these facts kept clearly in mind, and viewed also in connection with the

Hosted by Google

immense quantity of sediment known to be carried in the stream, it can be readily conceived what must be the results necessarily involved in the very nature of such an outpouring. A very large proportion of sediment is of course precipitated before reaching the lake shore, but enough is still held in suspension to produce marked effects when the flow of water is at last checked by debouching into the lake.

The accompanying map shows the location and

AREA OF THE DEPOSITS,

as determined by the examinations. The figures shown in the section, colored brown upon the chart, represent the thickness of the deposits at the various points where the rod was used. In recording these different borings care was taken to show only what was deemed to bear indisputable evidences of river mud or alluvion, embracing principally the results of the three successive crevasses since that of 1874, and possibly embodying those of other overflows anterior to that date, and it may be of some even before the levee system was adopted. It will be perceived that the greatest width and depth of deposit has been made opposite Frenier Station, on the Jackson Railroad, or where the main body of the crevasse water pours into the lake. At this point the cross section from the shore outward shows the deposit to have been made over a distance exceeding five miles, and the greatest thickness in that section to be about six and a half feet. The whole area of deposit embraces a compact mass, some twenty-two miles in length by an average of four miles in width, and contains, by calculation, about two hundred million cubic yards of sedimentary matter. To furnish some practical idea of the immensity of this accumulation, it may be stated, that if the material were distributed over the inhabited portion of New Orleans, it would be sufficient to raise the entire ground of the city more than four feet above its present low level.

The capacity of Lake Pontchartrain as a reservoir, its entire water contents being displaced, will allow the substitution there-

Hosted by Google

for of about ten thousand million cubic yards of earth or sedimentary matter. With the knowledge, then, that in a given number of years the capacity of the lake has been reduced to the extent of what two hundred million cubic yards of sediment would displace, it is within reach of arithmetical computation to calculate the length of time it would require to fill up the body of the lake, provided the crevasse should remain permanently open, with the same average discharge of water annually, and with the same general laws governing its action in the future as in the past. But as the number of years in which this estimated deposit has been accumulating cannot be ascertained with any degree of accuracy, it follows that no deductions can be made which would fix, even approximately, the happening of such an event at any specified date or period in the future. It can safely be predicted, however, that many generations will come and go before the citizens of New Orleans would be deprived of the benefits of Lake Pontchartrain as a navigable water. Agencies more active than the slow one of shoaling must, therefore, be taken into consideration as liable to produce anything like the immediate dangers which have been apprehended from the altered physical condition of the lake.

It has been clearly established that the

EFFECT OF THE CREVASSE,

up to the present time, has been to raise considerably the ordinary level of Lake Pontchartrain, which abnormal condition lasts generally about four months in the year, or during the flood period in the Mississippi River. This elevation of the surface of the lake is almost exclusively due to the immense volume of foreign water constantly precipitated into its basin from the crevasse, which must necessarily create for itself a new plane of discharge to the Gulf by the consequent forced raising of the water.

With this great cause of danger from the large amount of fresh

Hosted by Google

water, are combined the injuries which threaten from the periodical conditions of Lake Pontchartrain by overflow caused by accumulations of sea water.

It has been contended that the obstructions caused by the bridges and earthworks of the Mobile Railroad, between the Gentilly ridge and the highlands east of Pearl River, have contributed largely to the elevation of the water line in the lake, by damming and backing up the crevasse water, thus impeding its free discharge into the Gulf. A careful investigation of the line of road, when the water was at its highest mark, did not develop any facts which warrant such an assertion. On the contrary, the construction of the railroad embankments across the lowlands or marshes between the points mentioned is deemed a positive benefit to the city of New Orleans as a prevention of overflow. It unquestionably acts as a barrier to shut out the Gulf water, which in severe easterly gales rolls towards Lake Pontchartrain in a solid mass of thirty miles in width, and of a depth sufficient to inundate simultaneously the whole intervening marsh or lowland, upon which it is precipitated in a few hours' time. This massive wave, when it comes, is now arrested by the railroad embankment, acting as a protection levee, and the supply to the lake basin can only be made through the limited openings where the bridges are constructed. Thus the influx of this immense quantity of water is rendered more gradual, and would occupy days before it would pass through these narrow inlets, during which the subsidence of the gale or a fortunate change of wind would arrest its further accumulation and increase, and tend to discharge back into the Gulf by the outflow what had already been received. It will thus be seen that, in the confinement of the

RECEPTION OF SEA WATER

to these circumscribed entrances, these inlets serve to a certain degree the purposes of locks in lessening and delaying the admission of water into the lake, when without the embankments the whole expanse of thirty miles would afford the opportunity for the

Hosted by Google

ties extended to the surveying party by the officers of the revenue cutter Dix, as well as for the valuable assistance rendered so willingly by them and their crew.

My thanks are also eminently due to Messrs. Harrod and Reynolds, my assistants, and the detailed party of employees, who so efficiently labored and co-operated to bring the work to a satisfactory conclusion.

Very respectfully,

THOMAS S. HARDEE,

City Surveyor.

Hosted by Google